Survival Analysis of Listed Firms in Hong Kong

LI, Li

A Thesis Submitted in Partial Fulfillment of
Requirements for the Degree of
Master of Philosophy
in Economics

The Chinese University of Hong Kong
September 2007

Abstract

This paper makes a first attempt to allow for three types of different exits for listed companies to leave the public market. Using a competing risk model, we find that different firm characteristics lead to different forms of exits. We also show that firms with high profitability and growth are more inclined to go private while firms with low profitability and growth are more likely to suffer bankruptcy. Our results can be viewed as an important supplement to Fama and French (2003). Using our model, one is able to test different existing hypotheses for going private. We provide strong empirical support to the free cash flow hypothesis. Some evidence for the undervaluation hypothesis is also found. However, our results do not support the tax incentive hypothesis.

文章摘要

本文就香港上市公司的生存模式提供了經驗分析。通過競爭比較的生存分析模型，我們發現不同的公司基本面導致了上市公司不同的結局（因破產退市，被兼併收購，私有化收購)。高盈利高增長的公司傾向於私有化的進程，而贏利能力低增長慢的公司則更容易面臨破產的風險，這個發現可以認爲是對法瑪和弗蘭切(2003)有關上市公司生存分析的結論的重要補充。同時本文進一步地檢驗了解釋私有化動機的各種理論，得到了不同的結果。本文的計量分析強有力地支持了簡森的可支配現金流假設，認爲具備大量可支配現金流和較低成長前景的公司更傾向于選擇私有化。本文對於低估值假設文章僅提供了謹慎的贊同， 而稅收假設則在本文的經驗分析中完全無法得到證明。

Acknowledgement

I would like to express my deepest gratitude to my supervisor, Professor Chong Tai Leung for his persistent guidance. It is his thoughtful advice and assiduous supervision that bestowed me the unique opportunity to accomplish this thesis. I am also grateful to Professor Zhang Jun and Professor Li Hong Bin for their precious comments to improve this research. At last, I really appreciate the relentless supports and encouragement from He Qing and other Mphil classmates.

Contents

-

List of Tables

List of Figures

1. Introduction

The survival of public firms has attracted academic interest in recent years. Fama and French (2001) document that although the number of firms listed on the major US stock markets jumps from 156 per year for 1973-1979 to 549 per year for 1980-2001, more than two in five (44.1%) are delisted within ten years. Fama and French (2003) attribute the sharp decline in the survival rates of American listed companies to their involving characteristics (more left-skewed profitability and more right-skewed growth rate). Recently, there is a rich body of empirical studies, spanning numerous countries and time periods, attempting to infer the relationship between a listed firm's fundamentals and its survival. However, rare attempts have been made to examine the relationship between a firm's fundamentals and different forms of exits. A listed firm may fail to survive as a public entity for various reasons. The firm might be acquired by or be merged with another operating company. The firm can also choose to go private through a leveraged buyout. Alternatively, the firm might suffer bankruptcy or be liquidated. However, the existing literature does not distinguish different modes of exits. This paper adds to the literature by focusing on how, if at all, a listed firm's fundamentals influence its odds of going bankrupt, being M&A, and going private. A competing risk model (Dolton and van der Klaauw, 1999; Wheelock and Wilson, 2000) is employed to analyze the determinants influencing the life span of listed firms under different forms of exits.

Among the three possible reasons of exiting the public market, the public-to-private (PTP) transactions play a major role in recent years[1]. Opler and Titman (1993) estimate that there are over 2000 leveraged buy-out (LBO) valued in excess of $250 billion in the American market between 1979 and 1989. Weir et al. (2005a) reveal a rising trend of the PTP transactions in the UK during the late 1990s. In Hong Kong, throughout the 1980s and 1990s, about 12% of all the public firms are delisted. Among these delisted firms, firms going private constitute a large percentage of about 48%. In this paper, apart from investigating the relationship between a firm's fundamentals and its survival rate, we also use our model to test the existing hypotheses for the going-private transactions. There are several competing hypotheses for the PTP transactions in the literature. The "Free Cash Flow" hypothesis is the leading argument explaining the motivations behind the public-to-private transactions. It states that companies have a proclivity to abusively spend the free cash flow on negative NPV projects which dissipates the wealth of shareholders and thereby creates a source of premiums to be paid by taking a firm private. Jensen (1986a) characterizes those companies that exit the market through the PTP transactions as "firms and divisions of larger firms that have stable business histories and substantial free cash flow (i.e., low growth prospects and high potential for generating cash flows)—situations where agency costs of free cash flow are likely to be high" (p.325)[2].

[1] According to FactSet Mergerstat, there is a dramatic increase in recent private equity acquisitions. These transactions accounted for approximately 31.7% of public takeovers in 2005, up from 26.3% in 2004. It is estimated that private equity has grown 3000% in the past 10 years.

[2] Firms without growth prospects have fewer opportunities to reinvest the cash flow profitably in their current business. Given high potential cash flows, the management has incentives to dissipate free cash

An important symptom identified by Jensen (1986b) is that the PTP transactions are often financed by borrowing[3]. The previous studies give mixed empirical evidence for the free cash flow hypothesis. Lehr and Poulsen (1989), Denis (1992) and Opler and Titman (1993) support the free cash flow hypothesis, while Maupin et al. (1984), Servaes (1994), Kieschnick (1998) and Weir and Laing (2002) argue that the free cash flow hypothesis cannot explain the public firms' decisions to go private.

Another popular explanation is the tax incentive hypothesis, which states that public-to-private transactions are motivated by the tax savings associated with these transactions[4]. Kaplan (1989b), Newbould et al. (1992) and Halplern et al. (1999) show that the tax benefits significantly influence the decision to go private[5].

The undervaluation hypothesis, which provides a new perspective on the PTP transactions, is a newly emerging hypothesis proposed by Weir et al. (2005b). It states that public corporations with poor stock performance are not attractive to institutional investors. As a result, they usually suffer from thin trading and severe depression in stock prices. Given the soundness of financial performance, the management will perceive that the market undervalues their firms. Driven by this perception, they may

---

flows in diversified projects and to pursue ambitious expansions in order to justify their great remuneration packages (Murphy, 1985). The decision to go private can be viewed as a vehicle to mitigate these agency problems.

[3] Because the penalty of defaulting debt payment is more severe than dividend cuts, debt creation can force the management to pay out large parts of future cash flow in the form of coupon payments on the debt rather than to invest it unprofitably. Thus, debt reduces the agency costs of free cash flow by reducing the cash flow available at the discretion of the management.

[4] For example, the tax deductibility of interest payments on corporate debts and the increased depreciation deductions in tax payment.

[5] Other proponents of the tax incentive hypothesis include Lowenstein (1985) and Marais et al. (1989).

privatize the firms to reap the potential benefits of the undervalued assets.

Our competing risk model will be used to test the aforementioned hypotheses for the public-to-private transactions. The paper is structured as follows: The next section introduces the competing risk model. Section 3 presents the data and describes the covariates used in the model. Section 4 reports the estimations results of the Cox PH model and the competing risk model. Section 5 summarizes our findings.

2. Methodology

Suppose that firm i can leave the security market by one of the three possible routes (delisted for bankruptcy, being merged and going private)[6]. We observe the time to exit t_i and the exiting route j, where $j = 1$ corresponds to hazard of bankruptcy, $j = 2$ corresponds to hazard of being merged and $j = 3$ corresponds to hazard of going private. Corresponding to each possible risk there is a latent duration T_j, which is interpreted as the time which would elapse before the spell ends via route j, in the absence of any other risks which might cause the spell to end before this time. Thus, the actual exit time and exit route can be interpreted as the realizations of random variables T and J defined as:

$$T = \min(T_j, j = 1,2,3)$$
$$J = \arg\min_j (T_j, j = 1,2,3)$$

At each point in time, the hazard function for risk j is:

$$\lambda_j(t) = \lim_{\Delta t \to 0} \frac{\Pr(t \le T \le t + \Delta t, J = j | T \ge t)}{\Delta t}.$$

Given our competing risk framework and independent treatment of the different hazards, the overall hazard function can be written as

[6] In Wheelock and Wilson (200), they consider a competing risk model for the US banks facing two different risks.

$$\lambda(t) = \sum_{j=1}^{3} \lambda_j(t),$$

where $\lambda_1, \lambda_2, \lambda_3$ are the cause specific hazard functions for bankruptcy, being merged and going private respectively. Consider the risk specific hazard function with Cox proportional hazard type:

$$\lambda_{ji}(t|x_{ji}(t), \beta_j) = \lambda_{0j}(t)\exp[x'_{ji}(t)\beta_j], \qquad (j = 1,2,3.)$$

where λ_{0j} is the baseline hazard function specific to type j hazard at time t, $x_{ji}(t)$ is a vector of time dependent covariates for firm i specific to type j hazard at time t, β_j is the vector of unknown regression parameters to be estimated. Then the partial likelihood function for each specific hazard j is:

$$L_j(\beta_j) = \prod_{i=1}^{k_j} \frac{\exp[x'_{ji}(t_{ji})\beta_j]}{\sum_{l \in R(t_{ji})} \exp[x'_{jl}(t_{ji}), \beta_j]},$$

where k_j refers to the number of firms in specific hazard j, and $t_{j1} < \cdots < t_{jk_j}$ denotes the k_j ordered failures of hazard j. $R(t_{ji}) = \{l | t_{jl} \geq t_{ji}\}$ is the set of firms that have not left the security market at time t_{ji}. The likelihood function for the Cox CRM is

$$L(\beta_1, \beta_2, \beta_3) = \prod_{j=1}^{3} \prod_{i=1}^{k_j} \frac{\exp[x'_{ji}(t_{ji})\beta_j]}{\sum_{l \in R(t_{ji})} \exp[x'_{jl}(t_{ji})\beta_j]}.$$

The model is semi-parametric in the sense that the vector β can be estimated without imposing any assumption regarding the baseline hazard function via the definition of the proper partial likelihood function. Comparing with Cox PH model, parametric procedures require the exact form of $\lambda_{0j}(t)$. The inappropriate choice of hazard function will affect the reliability and stability of the estimates (Heckman and Singer, 1984).

As the baseline hazard function $\lambda_{0j}(t)$ varies only over time but not across firms, the unobserved heterogeneity of individuals will influence the soundness of the baseline hazard. To incorporate the unobserved heterogeneity into our model, we extend the Cox CRM by including a multiplicative term v[7] so that

$$\lambda_{ji}(t|x_j(t),\beta_j) = \lambda_{0j}(t)\exp[x'_{ji}(t)\beta_j]v_{ji},$$

where v_{ji} is the denotation of risk specific and unobserved individual effect. We assume that the unobserved heterogeneity is independent with the observed characteristics and follows a Gamma distribution with unit mean and variance theta. The marginal effect of the k^{th} covariate can be obtained by differentiating the hazard function:

$$\partial\lambda_j(t|x_j(t),\beta_j)/\partial x_j^k = \lambda_{0j}(t)\exp[x'_j(t)\beta_j]\beta_j^k = \beta_j^k\lambda_j(t|x_j(t),\beta_j).$$

[7] It is a commonly used functional form to improve the heterogeneity problem in CRM model by Manton (1986)—the exponential mean with a multiplicative error. Manton (1986) states that if the hazard function is well specified, then the precise parametric specification of the heterogeneity distribution is relatively innocuous.

If $\beta_j^k > 0$, then an increase in x_j^k will increase the probability of a firm to leave the public security market for a certain destination state *j*. Furthermore, we are also interested in the impact of a change in a covariate on the probability of exit via route *j* comparing with other exits. Note that the probability of exiting via route *j* conditional on existing at time *t* is given by

$$\Pr[j|t,x,\beta) = \frac{\lambda_j(t|x_j(t),\beta_j)}{\sum_{n=1}^{3}\lambda_n(t|x_n(t),\beta_n)}.$$

The sign of the partial derivative $\partial \Pr[j|t,x,\beta]/\partial x_j^k$ depends on all the parameters in the model. In the proportional hazard model, if $\beta_j^k > \beta_n^k, \forall n \neq j$, the sign of the partial derivative $\partial \Pr[j|t,x,\beta]/\partial x_j^k$ is positive (Thomas, 1996). In other words, an increase in x^k will increase the conditional probability of exiting via route *j* comparing with other types of exits if the estimated coefficient in λ_j is larger than the corresponding coefficients in all other hazard functions.

3. Data

3.1 Data Description

The main data used for this survival analysis, including the data of individual listed firms and macroeconomic data, are obtained from the Hong Kong data profile of the Pacific-Basin Capital Markets (PACAP) database. The annual balance sheet and income statement for each firm are gathered from the Financial Statement File of the PACAP, while the history of individual firms, including the establishment, the date of exit and the stock performance are retrieved from the Monthly Stock Price and Returns File. The security market size and market performance are collected from the Key Economic Statistics File, the Monthly Market Returns File of PACAP and the annual reports of listed firms. Our data set consists of all public corporations that are actively traded in the Hong Kong security market at the beginning of 1981 and each of them is followed up to the year when it exits from the stock market, or until the end of our study period (2001)[8], whichever comes first.[9] We exclude spin-offs, firms that go public after going private and firms that are relisted in other countries[10].

[8] The sample covers the main expansionary period of the Hong Kong financial market and the financial crises of 1987 and 1997, as well as a period of gradual transition of regulatory and governing policies in late 1980s. Both the implementation of the deregulation policy in the late 1980s and the following financial crisis in 1997 contribute to an accelerating wave of restructuring and consolidation among the existing firms in Hong Kong. Consequently, this gives us a unique opportunity to observe how the listed companies exit the market (bankruptcy, M&A, going private). In addition, Hong Kong experienced an important change in political environment when the British government handed over the sovereignty of Hong Kong to China. This political event has an impact on the security market.

[9] The first fiscal year of PACAP database is 1980.

[10] A large proportion of Hong Kong listed firms decide to leave the Hong Kong market and relist on other security markets such as the Singapore market for political reasons. As there is no change in the firms' attributes in this process, we exclude them from our samples.

In this paper, the date of exit is defined by the official announcement date of the delisting process instead of the actual reorganization date[11]. To further explore the delisting pattern, we classify the exits into three categories (bankruptcy, M&A, and going private). In the case of bankruptcy, the firm is trapped by a legally declared inability or impairment of ability to pay its creditor, or it is forced by the HKSE or other governing authorities' deregulatory actions to delist. Those different possibilities are denoted by B, C, and D of company status remarks in the PACAP. M&A refers to the firms that merge with another operating company or that are acquired by another public listed company. The status codes of the company are M, T and D. A going-private transaction is defined as one that converts a free-standing, publicly traded corporation into a privately held corporation, which is marked by P and D in the PACAP[12]. After disregarding the companies that lack complete accounting information, we have 748 companies in total. Among them, 89 companies disappear in the security market before 2001 and the remaining 659 observations are treated as right-censored. Table 1 provides the summary statistics of the durations for different types of exiting firms, while Table 2 provides detailed information about the distribution of exit for each year.

Table 1 Summary Statistics on Listed Firms' Duration

[11] Because there is a long time placement for the stock of any delisting transaction required by the HKSE, the actual date of reorganization may give a misleading and prolonged survival period of the delisted companies.

[12] The detailed description of the status codes of companies is presented in Appendix 1.

From Table 1, we can observe that during the sample period from 1981 to 2001, 748 companies were trading in the Hong Kong security market and 89 of them choose to leave the market by 2001 for different reasons. Note that the mean and median of the firm's survival period are the shortest for firms going bankrupt, followed by firms being acquired or merged and firms going private.

Table 2 Annual Summary Statistics on Listed Firms' Duration

From Table 2, there are three special periods in which a large number of public firms are being delisted. These are 1989, 1990 and 1995[13].

Figure 1 Kaplan-Meier Estimates of Survival Function

Figure 2 Kaplan-Meier Estimates of Hazard Function

To examine the general distribution of exits, we begin with a preliminary analysis without explanatory variables, using the standard nonparametric Kaplan-Meier estimators.[14] Figures 1 and 2 show the estimated Kaplan-Meier survival function and

[13] The June 4th incident in 1989 plays an important role for the delisting transactions around 1989 and 1990. The delisting surge around 1995 is due to the political reform introduced by Chris Patten, the last Governor of Hong Kong, which causes considerable annoyance to the PRC government. Furthermore, the Jardine Matheson Group, which was the largest conglomerate in Hong Kong, was delisted from the HKSE (Hang Seng Index) in 1994 and placed its primary listing in London. This was regarded as a vote of no confidence in the future of Hong Kong. Apart from the Jardine group, a good number of firms also relist in other security markets or go private. This explains to some extent why delisting transactions peaked in 1995.

[14] Suppose that the events occur at the discrete moments of $t_1, t_2, \ldots, t_k$. At period t_i, n_i firms are at risk and d_i firms exit. The Kaplan-Meier estimators of the hazard function and survival function are

hazard function, respectively, and summarize the results of this nonparametric analysis. As can be seen in Figures 1 and 2, there are two periods where the public corporations experience a significant decline in their survival rates: one is around the seventh year and the other is around the fourteenth year.

Figure 3 Comparisons of Survival Functions between Going private and Other Exits

Figure 4 Comparisons of Hazard Functions between Going private and Bankruptcy

Figure 5 Comparisons of Hazard Functions between Going private and M&A

From Figure 3, we can see that the delisting hazards accelerate after the fifth year; however, the three types of exits have different survival patterns. The exit through going private shows a more dynamic survival pattern compared with other exits, and it also maintains two similar sharp changes around the seventh year and the fourteenth year. The overall survival rate for the PTP exits is lower than other exits. We also observe that the survival rates of the firms that go bankrupt or are being M&A are quite stable. From Figures 4 and 5, there is an overlapping in the hazard functions. At the initial stage (before the 6th year), more firms are forced to leave the market or

---

$$h_{km}(t_i) = \frac{d_i}{n_i},$$

$$S_{km}(t) = \begin{cases} \prod_{t_i \le t} \left[1 - \frac{d_i}{n_i} \right], & t \ge t_1 \\ 1, & t < t_1 \end{cases}$$

merged with other firms and very few companies choose to go private. However, there is a booming of going-private transactions after the 6th year.

3.2 Selection of Covariates

Fama and French (2003) argue that a decrease in the profitability and a rise in the growth rate result in the sharp decline of survival rates of the American listed firms during 1973 and 2001. To test the conclusions of Fama and French (2003), we include two covariates, profitability and growth into our model. These measures are constructed in the same way as Fama and French (2003).

Firm Profitability: We measure profitability E/A as the ratio of earnings before interest but after taxes to total assets[15], which measures the capacity of a firm's core business to generate earnings.

Firm Growth: Following Fama and French's methodology, we define the growth of a firm as the growth rate of the firm's asset[16]. This means that assets acquired via mergers are included, as are investments in short-term assets[17]. Fama and French

[15] We calculate annual ratios as the aggregate value of the numerator divided by the aggregate value of the denominator. The results for each period are simple averages of annual values. Following Fama and French (2005), earnings before interest is income before extraordinary (PACAP item Inc10) plus interest expense (PACAP item Hkf40), plus income statement deferred taxes (PACAP item Hkf17) if it is available. Asset is PACAP data item Bal9.

[16] We calculate annual ratios as the aggregate value of the numerator divided by the aggregate value of the denominator. The results for each period are simple averages of annual values. Asset is PACAP data item Bal9.

[17] This measure is different from the sales growth that were frequently used in the free cash flow analysis by Lehn and Poulsen (1989) and Weir et al. (2005a).

(2003) find that the growth has a negative impact on the firm's survival period.

Free Cash Flow: The free cash flow is the cash flow in excess of what is required to fund all positive net present value projects (Jensen, 1986a). It is difficult to obtain a precise proxy for free cash flow because the firm's *ex ante* set of positive net present value projects is equivocal and hard to collect. Thus, different measures have been proposed (Gupta and Rosenthal, 1991; Opler and Titman, 1993). In this paper, we follow Lehn and Poulsen (1989) to calculate free cash flow as the net operating cash flow adjusted by the equity scale. This net operating cash flow is defined as

CF = Income - Tax - Interests - Dividends,

where

Income = Operating income before depreciation, (PACAP item Inc5);

Tax = Total income taxes, (PACAP item Inc7) minus change in deferred taxes from the previous year to the current year (PACAP item Hkf17);

Interests = Gross interest expense on short- and long-term debt (PACAP item Hkf40);

Dividends = Total dollar amount of dividends declared on common stock (PACAP item Mkt1, Mkt2).

CF evaluates post-tax cash flow that is not distributed to the security holders as either

interest or dividend payment[18]. Under the free cash flow hypothesis, the proportion of a firm's assets consisting of free cash flow should be positively associated with the odds of going private, ceteris paribus. A positive relationship is expected between free cash flow and the decision to go private.

Financial Leverage: Financial leverage can be measured as the ratio of the book value of the firm's long-term debt to the market value of its common stock. Jensen (1986a) argues that it is popular for the going-private transactions to utilize their debt capability, so LBO will convert the unstable expenses of stock dividend to stable interest expenses. This effectively restricts the management's abuse of free cash flow. We expect the going-private candidates to demonstrate less use of debt.

Tax: Tax reduction is an important source of gains in the going-private transactions (Kaplan, 1989a; Newbould et al., 1992). We measure the effective tax liability for each company in our sample. The effective tax liability has been calculated as TAX item as above and we deflate TAX by the asset value to adjust for the firm size effect.

Investment Expenditures: The free cash flow hypothesis argues that companies have a proclivity to abusively spend the free cash flow on negative NPV projects. According to this argument, we include the firm's level of investment expenditures into our model. We use a firm's expenditures on plant and equipment adjusted by the asset

[18] This whole construction of CF is similar to Lehn and Poulsen (1989) and the results for each period are simple averages of annual values.

value to control for the influence of size. If the gain of going-private transactions comes from the reduction of unprofitable investment expenditures, then the firms that will go private should maintain a higher level of investment expenditures compared to the M&A group and the firms remaining public.

The q Proxy: The q proxy (or Tobin's q) compares the market value of a company with the value of her assets. It is calculated by dividing the market value of a company by the replacement value of its assets. This measure has several implications. If the market value solely reflects the recorded assets of a company, q will be equal to 1. If q is greater than 1, it implies that the market value reflects some unmeasured or unrecorded assets of the company. We expect the going-private firms to have higher q values. Furthermore, the q proxy also indicates the analysts' view of the company's prospects. We obtain the market value of the company by discounting all the company's future cash flows, which are estimated by foreseeing the growth prospects of the company. A higher q value indicates that the firm has potentials in its business and that it maintains a promising prospect. Under the free cash flow hypothesis, firms with low growth prospects and high cash flow will be more likely to go private. Thus, we expect the q proxy to have a negative relationship with the odds of going private.

Stock Performance: There is widespread anecdotal evidence that poor stock price performance causes a company to go private, which supports the perceived undervaluation hypothesis. Thus, stock performance is an important determinant in

our model. To adjust for the market trend, we study the value of the firm's stock performance relative to the market's return over the survival period ending one year prior to the first official announcement of takeover transactions. This avoids the potential contamination of stock price run-ups associated with takeover interest in the firm. Individual stock performance is measured by the average of the Monthly Return without Dividends obtained from the PACAP. The market return is measured by the Equally-Weighted Returns without Dividends[19]. We also define a binary variable, which equals 1 if the stock beats the market, and equals 0 if the stock is underperformed. We include both the relative value proxy and the binary variable in our model. Firms with poor stock performance are not attractive to investors. Considering the high listing expenses and thin liquidity, a firm will prefer to go private. Therefore, we expect a negative relationship between the stock performance and the hazard to go private.

Firm Size: A wave of empirical studies has shown that small-scale firms have a lower likelihood of survival than their larger counterparts. This suggests that firm size should be an important covariate. Besides the logarithmic transformation of the total asset value, we also define the size of a firm as the percentage of her total asset relative to all the firms operating in the same industry. It should be noted that the mean of the size of firms going private is larger than that of firms from the bankruptcy sample and the M&A sample while the mean of the market share of firms going

[19] We also examine the alternative measures of stock performance and market return like Stock Monthly Return with Dividend, Equally-Weighted Market Returns without Dividend, or Value-Weighted Returns without Dividend. The results are robust to different specifications.

private is smaller.

In addition to the aforementioned firm-specific variables, we also include two measures of market sentiment, the turnover of the market and the turnover of individual stock. These indicators can be used to analyze how the security market performs in different stages and to measure investor sentiment. More importantly, they can reflect the extent of speculation behavior. The fact that there are two financial crises during our sample period, and that the speculations in the stock market reach a peak before both financial crises, have a tangible influence on the public firms' survival patterns.

Table 3 Proxies for Determinants of Listed Firms' Duration

Table 4 Comparison of the Going-private and Public Samples

Table 5 Comparison of the Going-private and Bankruptcy Samples

Table 6 Comparison of the Going-private and M&A Samples

The summary of these covariates is reported in Table 3. The table shows that there is a significant variation in firm-specific characteristics, which enables us to identify the effects of different determinants. Tables 4, 5 and 6 compare the going-private sample and others (public firms, bankrupt firms and M&A firms). From Tables 4 and 5, it is found that the firms that go private have a higher profitability. From Table 4, the market condition variables, except the Stock Turnover, are all significant. From Tables

5 and 6, the differences of market condition variables between the going-private sample, the M&A sample, and the bankruptcy sample are obvious. Note that there is no evidence that the going-private firms have an increased investment expenditure. The test results in Tables 4, 5 and 6 suggest that the stock performance of going-private firms is worsening. It signifies that stockholders of the going-private firms are experiencing wealth losses prior to the buyout, and the management will perceive this poor stock performance as an undervaluation of the company. Consequently, these firms are more likely to go private[20]. Our tests reveal that firms in the going-private sample have poor stock performance, but they are more profitable and have a high level of free cash flow. These serve as evidence for the free cash flow hypothesis and the undervaluation hypothesis.

[20] Zingale (1995) also suggests that the share prices of a firm going private should weaken before the real transaction takes place.

4. Empirical Analysis

4.1 General Survival Analysis by Cox Hazard Proportional Model

Fama and French (2003) state that lower profitability and faster growth result in the plunge of the survival rate of firms during 1981-2001. In this section, we would like to verify the validity of these conclusions in the context of the Hong Kong security market. In particular, we analyze the relationship between the firms' attributes and their survival rates using different survival models[21].

Table 7 Survival Distribution across Industries

Table 7 reports the survival rates of different industries. It is clear that the survival rates are stable across different industries, especially in three main industries (Real estate, Consolidated, and Industrial)[22]. We study the impacts of firm-specific determinants on the survival rates via the parametric Exponential and Weibull models and the semi-parametric Cox proportional model[23]. Table 8 reports the regression results for the Cox hazard function of 748 public corporations with different specifications. Table 9 displays the regression results for the Exponential and Weibull models.

---

[21] Our econometric techniques are more advanced than the sorting and cohort comparison methods used by Fama and French (2003).

[22] We do not include the financial industry because the measurements of financial performance and operation skills in the finance industry are totally different from other industries.

[23] Writing the hazard function as $\lambda_j(t,x)=\lambda_{0j}(t)\exp[x'(t)\beta_j]$, recall the Exponential hazard assumes $\lambda_{0j}(t)=$ constant $=\exp(\alpha)$, the Weibull model assumes $\lambda_{0j}(t)=\exp(\alpha)\alpha t^{\alpha-1}$, and the COX PH has no intercept and makes no assumption about the shape of the baseline hazard.

Table 8 Regression results for the Proportional Hazard Model ($n = 748$)

Table 9 Regression results for the Exponential and Weibull Model without Heterogeneity

In specification 1, profitability and growth are the main firm-specific factors. For all the models considered, the profitability and growth are both significant. Furthermore, the coefficient of growth has the expected sign as predicted by Fama and French (2003), while that of the profitability variable does not. The estimated coefficients of profitability are positive in all specifications, implying that the durations of firms with a higher level of profitability are shorter. The growth variable also has a positive estimated coefficient, which suggests that faster growing firms are more likely to leave the security market. The Exponential and Weibull models also confirm that the survival rates of public corporations are negatively related to their profitability and growth. Note that there is little variation of the estimates of profitability and growth across different models: the estimates for the coefficient of profitability in the Weibull and Cox models are respectively 17% and 5.5% higher in magnitude than that in the Exponential model, and the estimates for the coefficient of growth in the Weibull and Cox models are 9.6% and 9.5% higher in magnitude than that in the Exponential model, respectively.

Figure 6 Survival Function Estimates by Profitability Status

Figure 7 Survival Function Estimates by Growth Status

Figures 6 and 7 show that the survival rates are higher for firms with a lower profit (slower growth) than for firms with a higher profit (faster growth). For all the specifications considered in Table 8, the market turnover has a negative coefficient, indicating that hazard rates are lower when trading activities in the security market rise. Interestingly, we find that the turnover of an individual stock has a positive coefficient.

In specification 2, we include both the stock return (absolute value) and the stock performance variable (a binary variable indicating if the stock beats the market). The stock return variable has a positive sign while the stock performance has a negative sign. The last column of Table 8 displays the results of the complete model with other firm-specific attributes besides growth and profitability. We find that the free cash flow, tax, q proxy, leverage, and investment expenditure have no apparent impact on the survival of firms. The insignificance of these firm attributes is due to the pooling of data. Note that the size variable has a significantly positive coefficient. This is different from the results of Mata et al. (1995) and Agarwal and Audretsch (2001), which unveil the negative relationship between the size of a firm and its failure. There are two possible reasons. One is that previous studies only pay attention to the initial size (or entry size) of new firms while we use the average size of the firm over the whole sampling period. Yet another reason is that large corporations in Hong Kong do

not receive particular protection from the government nor enjoy any privileges[24].

The previous results ignore the problem of unobserved heterogeneity. To take the unobserved heterogeneity into account, we allow for Gamma heterogeneity in our original Cox PH, Exponential, and Weibull models. Table 10 summarizes the estimates of all duration models with Gamma heterogeneity.

Table 10 Regression Results from all Duration Models with Gamma Heterogeneity

The coefficient estimates are different from what we have earlier in the absence of heterogeneity. Furthermore, the goodness of fit of the models, as reflected in the log-likelihood, has improved dramatically. Recall that the hazard with heterogeneity consideration is $\lambda_j(t,x) = \lambda_{oj}(t)\exp[x'(t)\beta_j]\nu_j$ and that ν_j follows a Gamma distribution with unit mean and finite variance θ. The estimate of θ is used to measure the degree of within-group correlation, and the model without heterogeneity is reduced to the standard model when $\theta = 0$. In the Cox PH model with Gamma heterogeneity, we obtain an estimate of $\theta = 2.5516$, whose p-value of the likelihood-ratio test of $H_0: \theta = 0$ is close to zero. This suggests the existence of heterogeneity.

[24] In most Asian countries, large corporations are mostly state-owned and they enjoy privileges and protection from government. Therefore, "too big to fail" is common in Japan and some Southeast Asian countries.

In essence, our results show that the profitable firms are more likely to become delisted. The market value has a positive influence on a firm's duration, indicating that more firms survive when the security market has a promising prospect.

4.2 Competing Risk Analysis of Listed Firms

The duration analysis in the previous section focuses on the listing spell, ignoring the reasons for the delistings. In this subsection, we conduct a competing risk analysis of firms listed in the Hong Kong security market between 1981 and 2001. We distinguish three different reasons for the delistings, namely, bankruptcy, M&A, and going private.

Figure 8 The Baseline Survival Function of the Competing Risk Model

Figure 9 The Baseline Hazard Function of the Competing Risk Model

Figure 10 The Conditional Hazard Function of the Competing Risk Model

Figures 8 and 9 present the annualized baseline hazard estimates for the three different exits. They all share a similar pattern with the Kaplan-Meier estimates in Figure 3, although they are smaller in magnitude. From Figure 10, we can see that the year-to-year variation does not follow any smooth parametric distribution. Thus, we estimate the baseline hazard semi-parametrically.

Table 11 Determinants of Firms' Survival (CRM Model without Heterogeneity)

As most of the exits in our sample take the form of going private, it is therefore important to address the factors that may motivate these PTP transactions. The estimates for the standard Cox CRM model under two different specifications are reported in Table 11. In specification 1, we use the same variables as the Cox PH model to depict their differences directly. We check the robustness of these results by adding other firm-specific attributes to specification 2, which allows us to test whether the free cash flow or the tax incentive hypotheses can explain why firms go private. The estimated coefficients of the observed covariates, however, differ across various types of exits[25].

We can see from Table 11 that the coefficient for profitability is significantly negative in the case of bankruptcy, while it has a positive coefficient in the case of going private and it is insignificant for firms being merged. These indicate that profitable firms are more likely to go private and less likely to go bankrupt. The previous literature did not consider different forms of exits. Using the CRM model, we develop a detailed picture of the relationships between profitability and the survival rate for different exits. We show that that fast growing firms are more likely to leave the

[25] Previous duration analysis on other topics found that parameter estimates may be biased when unobserved heterogeneity is not controlled for (Deng et al., 2000). We will take this into consideration in our model.

security market through takeovers while steadily growing firms have a higher chance of going bankrupt. Our results are important supplements to those of Fama and French (2003).

Yet another important finding lies in the FCF variable. The coefficient for free cash flow is positive and significant for the going-private exit, while it is insignificant in the cases of bankruptcy and M&A. A rise in a firm's free cash flow significantly increases the probability of going private. This implies that a higher level of free cash flow may induce the management to undertake ambitious expansion plans or make personal appropriations. Our results are in line with those of Jensen (1989).

We also examine the effect of the q proxy[26] in our CRM model. In specification 2, the negative coefficient in the case of going private implies that firms with less profitable future reinvestment opportunities are prone to going private. However, firms going bankrupt have positive coefficients for the q proxy. Firms with a higher q proxy are more likely to invest their capital in promising projects as they have more profitable growth prospects. However, large investments in these projects may lead to insufficient liquidity and overborrowing, both of which increase the risk of bankruptcy.

Our model can also be used to test the undervaluation hypothesis. The negative

[26] It is used by Lehn and Poulsen (1989) and Lehn et al. (1990) as a proxy for Jensen's free cash flow problems and management qualities.

coefficient of the q proxy in the case of going private reflects the fact that firms with lower market valuation prefer to go private. In addition, the stock performance variable has a negative sign, indicating that poor stock performance is an important reason for going private. Due to asymmetric information, the management of undervalued firms will choose to go private. Our results reveal that the undervaluation hypothesis can explain different types of exits.

However, the results of leverage and investments are not significant in the CRM model. The tax variable is insignificant as well, so the tax incentive hypothesis cannot explain the PTP transactions. The size variable[27] is significantly positive for firms going private and firms suffering from bankruptcy. When we measure the size by another indicator (Market share), a significant positive coefficient is found in the case of M&A. By combining the results of these two measurements, we can cautiously conclude that size has a negative relationship with a firm's survival rate.

The signs of the coefficients of the market condition variables are consistent with the results of the Cox PH model. The turnover of the market has a positive impact on the survival of firms. The turnover of individual stock is significant in the case of M&A with a positive coefficient while the results are insignificant for other exits. It confirms that excessively active trading activities (unusual price movements) of a single stock demonstrate serious speculation problems and hostile acquisition threats,

[27] We also try the square of size in our model, but it does not change the results.

which should be reflected directly by an exit through M&A rather than bankruptcy or going private.

Table 12 Determinants of Firm's Survival (CRM Model with Heterogeneity)

We estimate the competing risk model allowing for heterogeneity and the results are reported in Table 12. It is found that the main estimates are almost identical to those of the standard model. Furthermore, all the thetas, except for the going-private case in specification 1, are close to zero. Therefore, there are no strong heterogeneity problems in our model.

4.3 Robustness Check

To check the robustness of our conclusions, we examine the firms listed after 1980 and repeat the same empirical analysis with these newly listed firms. In Table 13, we summarize the survival information for all new listed companies. Compared with the previous results, 171 firms which belong to seasoned firms (which have been listed in the market long before the starting time of our sample period) are removed. 42 delisted firms pertaining to the group of seasoned firms, which occupy 47 percent of whole delisting samples, are also excluded. The summary statistics of this subsample are reported in Table 13. The estimation results are reported in Table 14, which are consistent with the results obtained with full samples. Thus, our results are robust to

the use of alternative samples.

Table 13 Summary Statistics on New Lists' Duration

Table 14 Determinants of New Lists' Duration (CRM Model without Heterogeneity)

5. Conclusion

This paper makes several important contributions to the corporate survival literature. First, it makes a first attempt to estimate the odds of different exits for listed firms. Using a sample of listed firms from 1981 through 2001, this paper has studied the survival patterns of firms listed in the Hong Kong security market and has identified the effects of a firm's fundamentals on its odds of different exits. We find evidence that the decisions of a corporation to remain public, go private, be acquired or go bankrupt depend on her financial characteristics. Second, the main fundamentals of public firms (profitability and growth) have different impacts on the odds of bankruptcy and of going private. We find that firms with higher profitability are more likely to go private and less likely to go bankrupt. As far as growth is concerned, the results are ambiguous. However, we show that firms with faster growth are more likely to be merged or privatized, which can be seen as an important supplement to Fama and French (2003), who argue that lower profitability and faster growth lead to a decline in listed firms' survival rate. Third, this paper provides strong empirical evidence for the free cash flow hypothesis. We find that firms with higher free cash flow and lower growth prospects have a high hazard of going private. Fourth, we also analyze the tax incentive hypothesis. As the tax variable is not significant in our model, the tax incentive hypothesis does not hold in the Hong Kong market. This is probably due to the low tax rate policy of the Hong Kong government (17.5% for profit tax). Last but not least, there are also some supporting results for the

undervaluation hypothesis that firms with poorer stock performance and lower valuation are more likely to go private.

Appendix I

Status of Company (STATCO)

STATCO	**Status of Company Remarks**
A	Active
B	Bankrupt
C	Compulsory delisting
D	Delisted, reason unknown
G	Changed to government owned
M	Merged with another company
O	Delisted due to company reorganization
P	Changed to private company
R	Company reclassified into another industry
S	Company under reorganization, data unavailable in PACAP
T	Acquired by another company
Z	Delisted, then relisting with the same company name

Appendix II: Summary of Companies Incorporated in New Locations from Hong Kong during 1992-1997

Name	New Incorporation Location	Effective Date	Capital Sources	Chairman
Asia Standard International Group Ltd.	Bermuda	1992-1-22	Chinese Capital	Fung, Siu To Clement
HKR International Ltd.	Cayman Islands	1992-1-22	Chinese Capital	Cha, Chi Ming
Dickson Concepts (International) Ltd.	Bermuda	1992-2-18	Chinese Capital	Dickson Poon
Unison Knitting Factory Ltd.	Bermuda	1992-3-17	Chinese Capital	Ng, Chung
Chow Sang Sang Holdings International Ltd.	Bermuda	1992-4-28	Chinese Capital	Chow, Kwen Lim
Chung Wah Shipbuilding Engineering Co. Ltd.	Bermuda	1992-4-14	Chinese Capital	Hong, Wah Sang
Asean Resources Ltd.	Bermuda	1992-5-12	Chinese Capital	NA
Semi-Tech Microelectronics Inc.	Bermuda	1992-6-30	Chinese Capital	Ting, James Henry
Polyson China Limited	Bermuda	1992-7-7	Chinese Capital	NA
Supreme Investment Limited.	Cayman Islands	1992-8-11	Chinese Capital	Chan, Po Fun Peter
Wah Shing International Holdings Ltd.	Cayman Islands	1992-8-11	Chinese Capital	Ng, Hung San Robert
Tse Sui Luen Jewellery (International) Ltd.	Bermuda	1992-9-2	Chinese Capital	Tse, Sui Luen
Herald (Hong Kong) Ltd.	Bermuda	1992-10-20	British Capital	G. Bloch
Tung Fong HungMedicine Co.Ltd	Cayman Islands	1992-10-21	Chinese Capital	Chen, Hok Leung
Ming Ren Investment & Enterprises Ltd.	Bermuda	1992-11-24	Chinese Capital	Sze, Ka Suen
Axiom Forest Resources	Bermuda	1992-12-15	Chinese Capital	Hu, Fa Kuang
Hong Kong Daily News & Trading Holdings Ltd.	Bermuda	1993-5-25	Chinese Capital	Wong, Chi Fai
Jademan (Holdings) Ltd.	Bermuda	1993-6-16	Chinese Capital	Wong, Yuk Lang
China Investments Holdings Ltd.	Bermuda	1993-9-14	Chinese Capital	Leung, Siu Fai
Stelux Holdings International Ltd.	Bermuda	1995-2-21	Chinese Capital	Wong, Chue Meng
Giordano International Limited	Bermuda	1995-5-29	Chinese Capital	Lai, Tsz Ying
Lucky Man Properties Ltd.	Bermuda	1996-4-30	Chinese Capital	Li, Chung Keung
Asia Orient Holdings Ltd.	Bermuda	1996-9-17	Chinese Capital	Fung, Siu To Clement
Brilliant View Holdings Ltd.	Bermuda	1996-11-26	Chinese Capital	Ych, Lim Por Yen
Grande Holdings Ltd.	Bermuda	1997-7-15	Chinese Capital	Ho, Wing On Christopher
Nam Pei Hong (Holdings) Ltd.	Bermuda	1997-9-30	Chinese Capital	Shum, Yuk Bui
South China Strategy Investment Holdings Ltd.	Cayman Islands	1997-10-14	Chinese Capital	Ng, Hung San Robert
The Kowloon Motor Bus Co.Ltd.	Bermuda	1997-11-18	Chinese Capital	Woo, Pak Chuen

Sources: The Stock Exchange of Hong Kong Limited.

References:

Agarwal, R., D.B. Audretsch (2001). "Does Entry Size Matter? The Impact of the Life Cycle and Technology on Firm Survival," *Journal of Industrial Economics*, 49(1), pp. 21-43.

Amemiya, T. (1995). "A Note on Left Censoring," in C. Hsiao, K. Lahiri, L.F. Lee and M. Pesaran, (ed.), *Analysis of Panels and Dependent Variable Models*, Cambridge University Press, Cambridge, pp. 7-22.

Deng, Y., J.M. Quigley, and R. van Order (2000). "Mortgage Terminations, Heterogeneity and the Exercise of Mortgage Options," *Econometrica*, 68(2), pp. 275-307.

Denis, D.J. (1992). "Corporate Investment Decisions and Corporate Control: Evidence from Going-Private Transactions," *Financial Management*, 21(3), pp. 80-94.

Dolton, P.J., and W. van der Klaauw (1999). "The Turnover of Teachers: A Competing Risks Explanation," *Review of Economics and Statistics* 81(3), pp. 543-552.

Fama, E F. and K.R. French (2001). "Disappearing Dividends: Changing Firm Characteristics or Lower Propensity to Pay," *Journal of Financial Economics*, 60(1), pp. 3-43.

Fama, E F. and K.R. French (2004). "New Lists: Fundamentals and Survival Rates," *Journal of Financial Economics*, 73(2), pp. 229-269.

Gupta A. and L. Rosenthal (1991). "Ownership Structure, Leverage, and Firm Value: The Case of Leveraged Recapitalizations," *Financial Management*, 20(3), pp. 69-83.

Halpern, P., R. Kieschnick and W. Rotenberg (1999). "On the Heterogeneity of Leveraged Going Private Transactions," *Review of Financial Studies*, 12(2), pp. 281-309.

Heckman, J. and B. Singer (1984). "A Method for Minimizing the Impact of Distributional Assumption in Econometric Models for Duration Data," *Econometrica*, 52(2), pp. 271-320.

Heckman, J.J. and B.E. Honoré (1989). "The Identifiability of the Competing Risks Model," *Biometrika*, 76(2), pp. 325-330.

Jensen, M. (1986a). "Agency Costs of Free Cash Flow, Corporate Finance and Take-overs," *American Economic Review*, 76(2), pp. 323-339.

Jensen, M. (1986b). "The Takeover Controversy: Analysis and Evidence," *Midland Corporate Finance Journal*, 4(2), pp. 323-329.

Jensen, M. (1989). "The Eclipse of the Public Corporation," *Harvard Business Review* (Sept/Oct), pp. 61-74.

Kaplan, S. (1989a). "Management Buyouts: Evidence on Taxes as a Source of Value," *Journal of Finance*, 44(3), pp. 611-632.

Kaplan, S. (1989b). "The Effects of Management Buyouts on Operating Performance and Value," *Journal of Financial Economics*, 24(2), pp. 217-254.

Kieschnick, R. (1998). "Free Cash Flow and Stockholder Gains in Going Private Transaction Revisited," *Journal of Business Finance & Accounting*, 25(1&2), pp. 187-202.

Lehn, K and A. Poulsen (1989). "Free Cash Flow and Stockholder Gains in Going Private Transactions," *Journal of Finance*, 44(3), pp. 771-787.

Lehn, K., Netter, J. and A. Poulsen (1990). Consolidating Corporate Control: Dual-Class Recapitalizations versus Leveraged Buyouts. *Journal of Financial Economics*, 27, pp. 557–580.

Lowenstein, L. (1985). "Management buyouts," Columbia Law Review, 85, pp. 730-784.

Manton, K. G., E. Stallard, and J. W. Vaupel (1986). "Alternative Models for the Heterogeneity of Mortality Risks among the Aged," *Journal of the American Statistical Association*, 81(395), pp. 635-644.

Marais, L., Katherine S. and A. Smith (1989). "Wealth Effects of Going Private for Senior Securities," *Journal of Financial Economics*, 23(1), pp. 155-191.

Mata, J., P. Portugal and P. Guimaraes (1995). "The Survival of New Plants: Start-up Conditions and Post-entry Evolution," *International Journal of Industrial Organization*, 13(4), pp. 459-481.

Maupin, R.J., C.M. Bidwell and A.K. Ortegren (1984). "An Empirical Investigation of the Characteristics of Publicly-Quoted Corporations: Which Change to Closely-Held Ownership Through Management Buyouts," *Journal of Business Finance & Accounting*, 11(4), pp. 435-450.

Newbould, G., R. Chatfield and R. Anderson (1992). "Leveraged Buyouts and Tax incentives," *Financial Management,* 21(1), pp. 50-57.

Murphy, K. J. (1985). "Corporate Performance and Managerial Remuneration: An Empirical Analysis," *Journal of Accounting and Economics*, 7(1-3), pp. 11-42.

Opler, T. and S. Titman (1993). "The Determinants of Leveraged Buyout Activity: Free Cash

Flow vs. Financial Distress Costs," *Journal of Finance*, 48(5), pp. 1985-1999.

Servaes, H. (1994). "Do Takeover Targets Overinvest?" *Reviews of Financial Studies*, 7(2), pp. 253-277.

Sueyoshi, G.T. (1992). "Semiparametric Proportional Hazards Estimation of Competing Risks Models with Time-Varying Covariates," *Journal of Econometrics*, 51(1-2), pp. 25-58.

Thomas, J. M. (1996). "On the Interpretation of Covariate Estimates in Independent Competing Risks Models," *Bulletin of Economic Research,* 48(1), pp. 27-39.

Weir, C.M. and D. Laing (2002). "Governance Characteristics and Non-hostile Take-overs in the UK: An Empirical Analysis," Paper presented to the Financial Management Association Conference, San Antonio.

Weir, C.M., D. Laing and M. Wright (2005a). "Incentive Effects, Monitoring Mechanisms and the Market for Corporate Control: An Analysis of the Factors Affecting Public to Private Transactions in the UK," *Journal of Business Finance & Accounting*, 32(5) & (6), pp. 909-943.

Weir, C.M., D. Laing and M. Wright (2005b). "Undervaluation, Private Information, Agency Costs and the Decision to Go Private," *Applied Financial Economics*, 15(13), pp. 947-961.

Wheelock D. and P. Wilson, (2000). "Why do Banks Disappear? The Determinants of US Bank Failures and Acquisitions," *Review of Economics and Statistics*, 82(1), pp. 127-138.

Zingales, L. (1995). "Insider Ownership and the Decision to Go Public," *Review of Economic Studies*, 62(3), pp. 425-448.

Table 1 Summary Statistics on Listed Firms' Duration

Existing Type	Full Sample	Bankruptcy	M&A	Private
Failed	89	20	26	43
Censored	659			
Mean	9.977273	8	9.346154	10.18605
Median	9	7	8.5	10
Min	1	3	3	3
Max	20	20	19	20
Std	6.043862	3.797506	3.887851	3.831299

Table 2 Annual Summary Statistics on Listed Firms' Duration

Year	Total	Bankruptcy	M&A	Private
1986	6	1	4	1
1987	5	3	2	0
1988	6	1	4	1
1989	11	2	1	8
1990	11	0	4	7
1991	2	0	0	2
1992	6	2	0	4
1993	1	0	1	0
1994	1	0	1	0
1995	10	1	3	6
1996	4	1	1	2
1997	4	0	1	3
1998	5	1	3	1
1999	5	2	0	3
2000	4	2	1	1
2001	8	4	0	4
Sum	89	20	26	43

Table 3 Proxies for Determinants of Listed Firms' Duration

Variable	Definition and Construction	Expected Sign			Mean
		Bankruptcy	M&A	Going Private	
Profitability	INC/A as the ratio of income before interest and taxes to total assets, in percent	Negative Fama (2003)	Negative Fama (2003)	Negative Fama (2003)	0.0488
Growth	The growth rate of the firm's asset.	Positive Fama (2003)	Positive Fama (2003)	Positive Fama (2003)	0.3607
Tax	Total income taxes, minus change in deferred taxes from the previous year to the current year, deflated by asset	NA	NA	Positive Tax	0.0109
Leverage	Ratio of the book value of the firm's long term debt to the market value of its common stock	NA	NA	Negative FCF	0.2876
Investment Expenditure	Firm's expenditures on plant and equipment adjusted by asset	NA	NA	Negative FCF	0.2096
Free Cash Flow	CF = (Income - Tax - Interests - Dividends) / Equity	NA	NA	Positive FCF	-0.1723
q	Ratio of the market value of a firm's common stock to its replacement value	NA	Positive	Negative FCF & Undervaluation	1.8419
Size	Logarithm of total asset	Negative	Negative	Negative	13.1688
Stock Performance	Relative value of the firm's stock return to market returns	Negative	NA	Negative Undervaluation	-0.0025

Note: Expected signs are predicting results in accordance to different theoretical explanations. FCF stands for the free cash flow hypothesis, Tax stands for tax incentive hypothesis and Undervaluation stands for the undervaluation hypothesis.

Table 4 Comparison of Going-Private and Public Samples

	Private Sample		Public Sample		
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**t-value**
Profitability	0.2255	0.2451	0.0405	0.1415	-7.8420***
Growth	0.5299	0.8088	0.3399	0.7455	-1.6083
Tax	0.0141	0.0115	0.0107	0.0100	-1.8297
Leverage Debt: Equity ratio	0.1870	0.2739	0.2946	0.8597	2.0111**
Investment Expenditure	0.2465	0.2071	0.2093	0.2174	-1.1393
Free Cash Flow	0.0623953	0.0472	-0.1902	0.6643	-2.4914**
q	0.6427399	2.7117	1.8765	3.4642	2.2896
Size	13.37482	1.7926	13.1608	1.5145	-0.7651
Stock Performance	-0.0074	0.0238	-0.00137	0.0421	0.9287
Market Share	0.0090729	0.0124	0.0071	0.0126	-1.0265
Turnover (Market)	91094.46	177865.4	198563.3	712006.8	2.7724**
Market Return	0.0273197	0.0240	0.0148249	0.0428	-3.1041***
Turnover (Stock)	3511.978	5805.646	3033.148	16550.46	-0.4374
Stock Return	0.0240905	0.0098	0.0161	0.0148	-4.9604***

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

.

Table 5 Comparison of Going-Private and Bankruptcy Samples

	Private Sample		Bankruptcy Sample		
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**t-value**
Profitability	0.2255	0.2451	-0.0807	0.3159207	-4.2031***
Growth	0.5299	0.8088	0.1133	0.2909175	-2.2289**
Tax	0.0141	0.0115	0.0073	0.0065092	-2.9875***
Leverage Debt: Equity ratio	0.1870	0.2739	0.4419	0.6231095	1.7925
Investment Expenditure	0.2465	0.2071	0.1720	0.1772	-1.4924
Free Cash Flow	0.0623953	0.0472	-0.3387	0.9951	-2.6620**
q	0.6427399	2.7117	1.8952	1.5867	1.9137
Size	13.37482	1.7926	12.4903	2.8024	-1.3203
Stock Performance	-0.0074	0.0238	-0.0422	0.0739	3.5799***
Market Share	0.0090729	0.0124	0.0133	0.0224	-2.8121***
Turnover (Market)	91094.46	177865.4	32359.8	53354.52	-1.9898*
Market Return	0.0273197	0.0240	0.0148	0.0428	-3.1041***
Turnover (Stock)	3511.978	5805.646	631.2467	641.2411	-3.2139***
Stock Return	0.0240905	0.0098	0.0234	0.0074	-0.3014

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 6 Comparison of Going-Private and M&A Samples

	Private Sample		M&A Sample		
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**t-value**
Profitability	0.2255	0.2451	0.0660	0.1687	-2.9219***
Growth	0.5299	0.8088	0.7973	1.8802	0.8182
Tax	0.0141	0.0115	0.0138	0.0200	-0.0585
Leverage Debt: Equity ratio	0.1870	0.2739	0.1522	0.1996	-0.6086
Investment Expenditure	0.2465	0.2071	0.1765	0.2326	-1.2627
Free Cash Flow	0.0623953	0.0472	0.0215	0.1196	-1.9887*
q	0.6427399	2.7117	2.9078	3.2774	3.1058***
Size	13.37482	1.7926	13.0448	2.0847	-0.6709
Stock Performance	-0.0074	0.0238	0.0097	0.0456	2.049**
Market Share	0.0090729	0.0124	0.0250	0.0272	2.8170***
Turnover (Market)	91094.46	177865.4	176318.3	623778.9	0.6801
Market Return	0.0273197	0.0240	0.0235	0.0048	-0.2875
Turnover (Stock)	3511.978	5805.646	10065.73	29727.74	1.1114
Stock Return	0.0240905	0.0098	0.0333	0.0439	0.6399

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 7 Survival Distribution across Industries

Industry	Obj. N	Survival rate 2 years	Survival rate 5 years	Survival rate 10 years	Survival rates 15 years
UTILITIES	18	1.0000	0.8462	0.6663	0.4760
PROPERTIES	129	1.0000	0.9827	0.8726	0.7961
CONSOLIDATED ENTERPRISES	255	1.0000	0.9765	0.8997	0.8163
INDUSTRIALS	313	1.0000	0.9848	0.9041	0.8324
HOTELS	20	1.0000	1.0000	0.8235	0.6373
OTHERS	13	1.0000	NA	0.5303	0.5303
TOTAL	748	1.0000	0.9793	0.8702	0.7769

Table 8 Determinants of Firm Survival
Regression results from the Proportional Hazard Model (n=748)

	SPECIFICATION		
	I	**II**	**III**
Profitability	2.747573***	2.957834**	2.389442***
Growth	0.2266691**	0.2568904	0.279***
Size	0.2674715***	0.3745612***	0 .3014***
Turnover (M)	-0.0015***	-0.00166*	-0.0016*
Turnover (S)	0.0197**	0.01837*	0.0158
Stock performance	-13.34596***	-6.5768***	-13.92981***
Stock return		14.25674***	
FCF			0.6471*
Tax			8.623
Q			-0.0205
Leverage			-0.4165
Investment			-0.3813
-ln L	499.68	488.318	494.803

* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 9 Determinants of Firm Survival
Regression results from the Exponential and Weibull Model without Heterogeneity

Variable	Exponential		Weibull	
	Coef.	P>|z|	Coef.	P>|z|
Profitability	2.6032	0	3.0453	0
Growth	0.2069	0.02	0.2268	0.01
Size	0.1994	0.012	0.2824	0
Turnover (M)	-0.0015	0.004	-0.00163	0.002
Turnover (S)	0.0248	0.002	0.0218	0.01
Stock performance	-8.7477	0.008	-14.0014	0
Constants	-7.2641	0	-10.9087	0
theta			1.97352	
-ln L	272.4235		247.1173	

Table 10 Regression Results from all Duration Models with Gamma Heterogeneity

Variable	Cox PH	Exponential	Weibull
	Coef.	Coef.	Coef.
Profitability	-0.14257	-0.0456	-0.1724
Growth	0.0479	0.03369	0.07615
Size	0.0009314	0.00446	-0.0024
Turnover (M)	-0.000033	0.0000176	0.000017
Turnover (S)	-0.0057	-0.0035	-0.0065
Stock performance	-3.8579	-1.2918	-5.4298
FCF	0.2157	0.1315	0.1976
Tax	-6.8543	-3.7680	-4.1335
q	0.0408	0.02140	0.0437
Leverage	-0.1275	-0.0974	-0.0746
Investment	-0.1422	-0.1384	-0.2425
Constants	NA	-0.1384**	-0.2425***
theta	2.5516***	2.4582***	2.6211***
- ln L	331.91486	108.8778	67.537495

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 11 Determinants of Firms' Survival (CRM Model without Heterogeneity)

	SPECIFICATION I			SPECIFICATION II		
	RISK FOR BANKRUTCY	**RISK FOR M&A**	**RISK FOR PRATIZATION**	**RISK FOR BANKRUTCY**	**RISK FOR M&A**	**RISK FOR PRVIATIZATION**
PROFTABILITY	-3.0515***	1.1989	4.9439***	-4.0443***	-8.3243	3.4121***
	0.000	0.55	0	0.001	0.426	0
GROWTH	-0.9699	0.3095**	0.3105***	-1.2629	0.3638**	0.5734***
	0.628	0.013	0.006	0.532	0.027	0
SIZE	0.5173***	0.1940	0.5300***	0.6507***	0.2093	0.5177***
	0. 001	0.288	0	0.002	0.276	0
TURNOVER (MARKET)	-0.0051	-0.0011**	-0.0019**	-0.0046	-0.001**	-0.0017**
	0.471	0.02	0.014	0.497	0.02	0.029
TURNOVER (STOCK)	-0.2964	0.0361***	0.0042	-0.5475	0.02586*	0.0004
	0.193	0	0.72	0.096	0.009	0.93
STOCK PERFORMANCE	-24.7409***	12.1354**	-5.928	-25.4560***	12.0528*	-9.9944
	0	0.017	0.459	0	0.028	0.329
FCF				0.3675	10.9011	15.0217***
				0.274	0.314	0
TAX				31.5831*	26.4934	-5.8077
				0.089	0.361	0.746
q PROXY				0.1767***	0.1231	-0.4449***
				0.001	0.011	0
LEVERAGE				-0.1151	-1.3721	-1.3365*
				0.234	0.212	0.091
INVESTMENT				-0.3223	-1.4312	0.0621
				0.802	0.367	0.944
- ln L	458.4366			416.3665		

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 12 Determinants of Firm's Survival (CRM Model with Heterogeneity)

	SPECIFICATION I			SPECIFICATION II		
	BANKRUTCY	**M&A**	**PRIVATE**	**BANKRUTCY**	**M&A**	**PRIVATE**
PROFTABILITY	-3.0515***	1.1989	4.8089***	-4.0443***	-8.3243	3.3639***
GROWTH	-0.9699	0.3095***	0.3141**	-1.2629	0.3638**	0.5135***
SIZE	0.5173**	0.1941	0.5691***	0.6507***	0.2093	0.5431***
TURNOVER(M)	-0.0051	-.0011801**	-0.0019*	-0.0046	-0.0011*	-0.0017
TURNOVER(S)	-0.2964	0.0361***	0.0050	-0.5475	0.0258**	0.0011
STOCK PERFORMANCE	-24.7409***	12.1353**	-11.6351	-25.4561***	12.0528**	-15.6056**
FCF				0.36751	10.9011	14.7894***
TAX				31.5831	26.4934	-4.1489
q PROXY				0.1767*	0.12316**	-0.4229***
LEVERAGE				-0.1151	-1.3721	-1.2611*
INVESTMENT				-0.3223	-1.4312	0.1066
theta	2.11e-16	2.11e-16	0.1638*	2.11e-16	2.11e-16	0.1173
- ln L	**456.8605**			**421.1978**		

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Table 13 Summary Statistics on New Lists' Duration

Existing Type	Full Sample	Bankruptcy	M&A	Going Private
Failed	47	9	12	26
Censored	530			
Mean	7.64991	7.44444	9.41667	7.269231
Min	1	4	3	2
Max	20	13	14	15
Std	4.31311	3.20590	4.33712	3.34135

Table 14 Determinants of New Lists' Survival (CRM Model without Heterogeneity)

	RISK FOR BANKRUTCY	RISK FOR M&A	RISK FOR PRATIZATION
	Coef.	Coef.	Coef
PROFTABILITY	-4.4447***	-35.9983**	4.1963***
GROWTH	-1.6741*	1.0958***	0.6401***
SIZE	0.6145*	0.7172*	0.5634***
TURNOVER(MARKET)	-0.0003	-0.0005	-0.0023
TURNOVER(STOCK)	-0.3911	0.0043	-0.0056
STOCK PERFORMANCE	-12.7366	13.4557*	-16.9729**
FCF	0.5059*	42.9285**	13.8738***
TAX	32.9826	64.1161	11.8803
q PROXY	0.1467***	0.1763***	-0.3886**
LEVERAGE	-1.5149***	-1.9267	-0.8838
INVESTMENT	1.7926***	0.8638	1.1821
- ln L	192.7117		

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

Figure 1 Kaplan-Meier Estimates of Survival Function

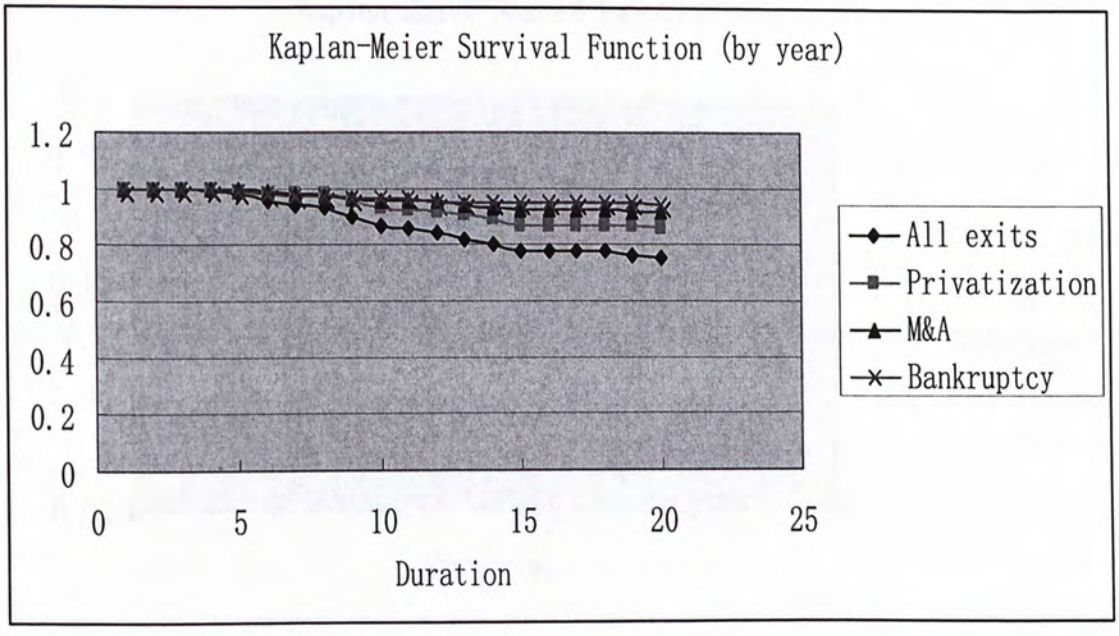


Figure 2 Kaplan-Meier Estimates of Hazard Function

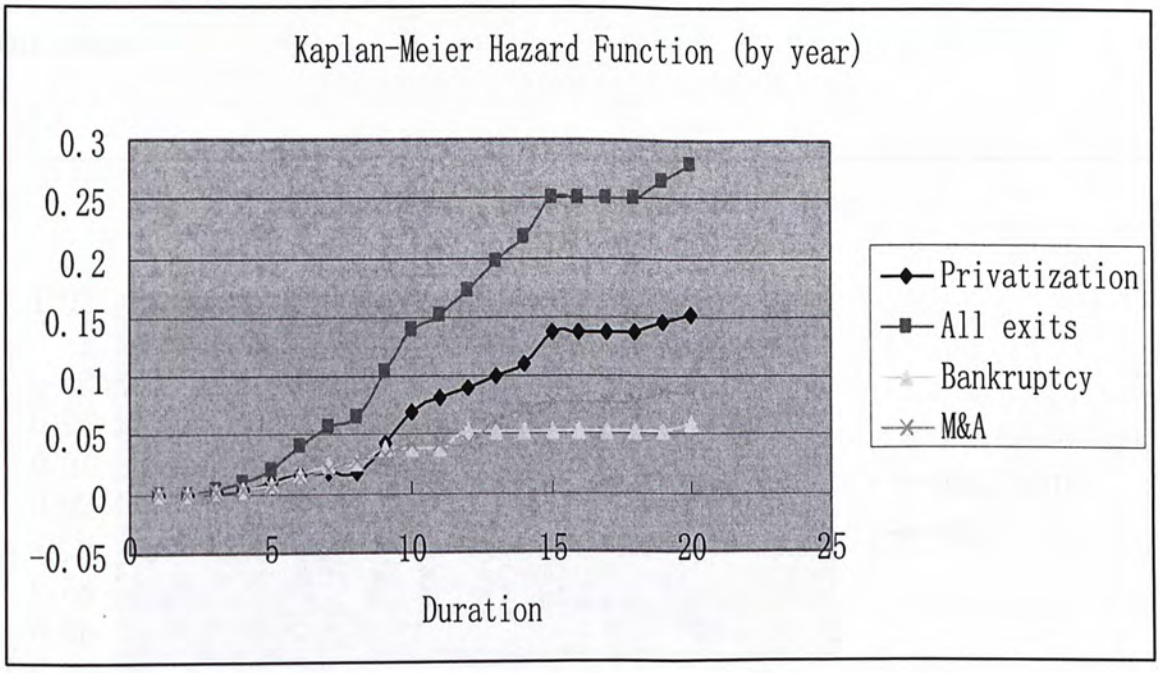


Figure 3 Comparison of Survival Functions between Exits for Going Private and Other Exits

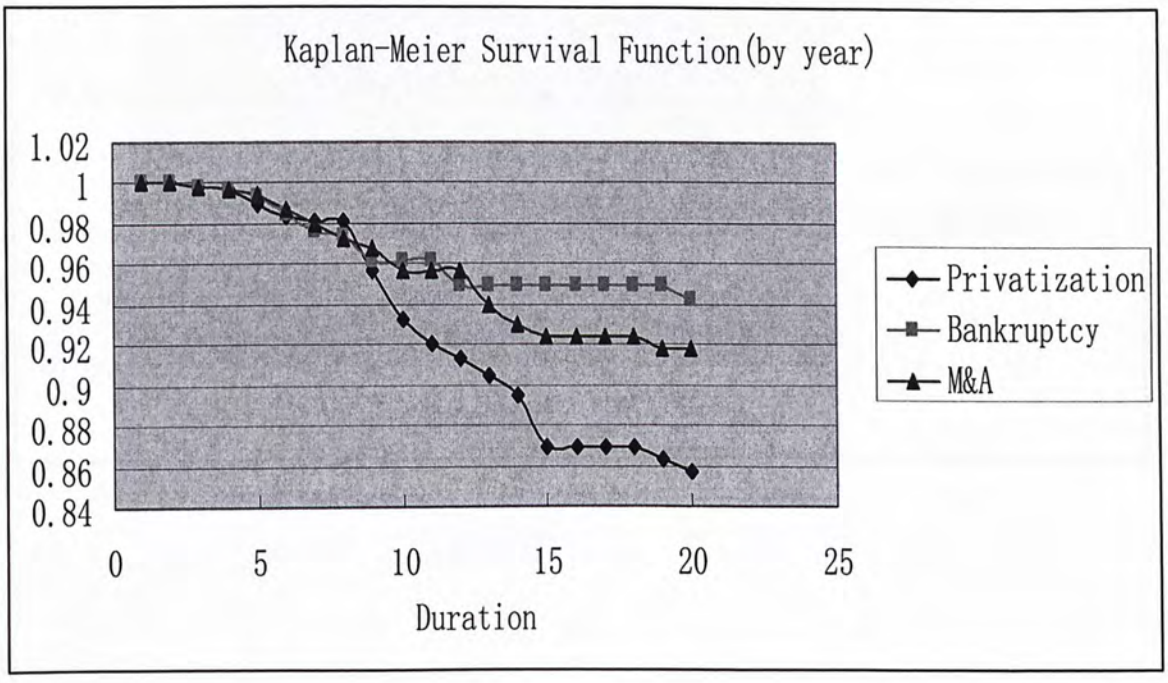


Figure 4 Comparison of Hazard Functions between Exits for Going private and Bankruptcy

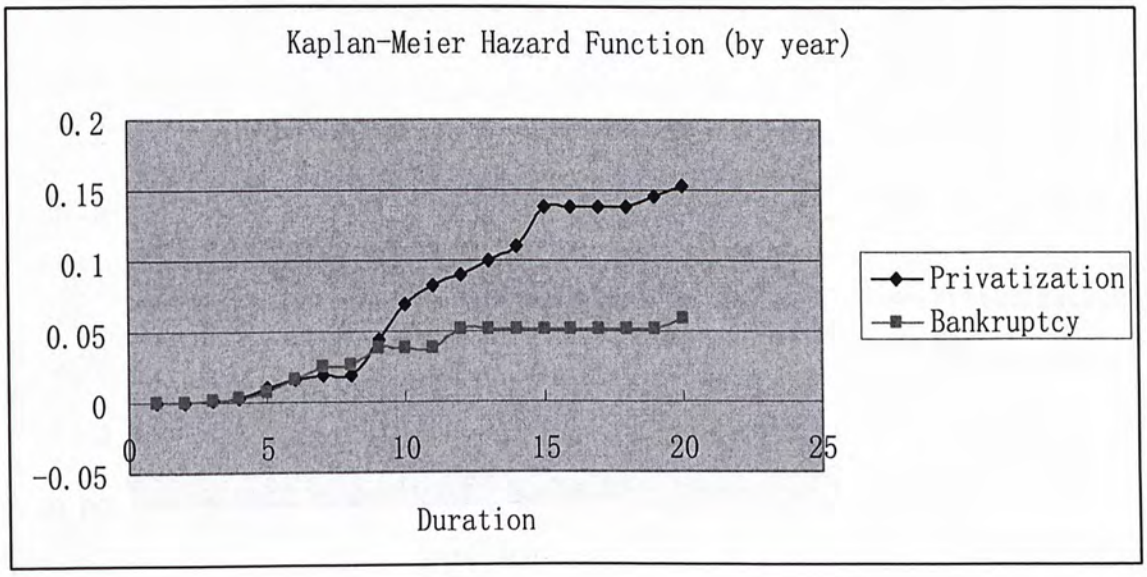


Figure 5 Comparison of Hazard Functions between Exits for Going private and M&A

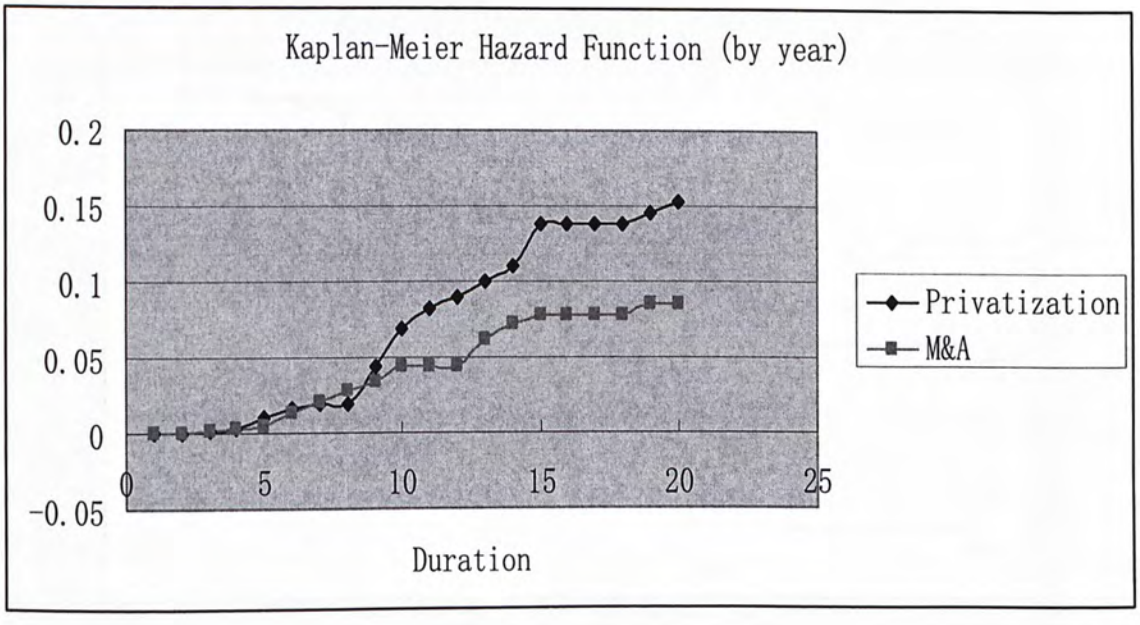
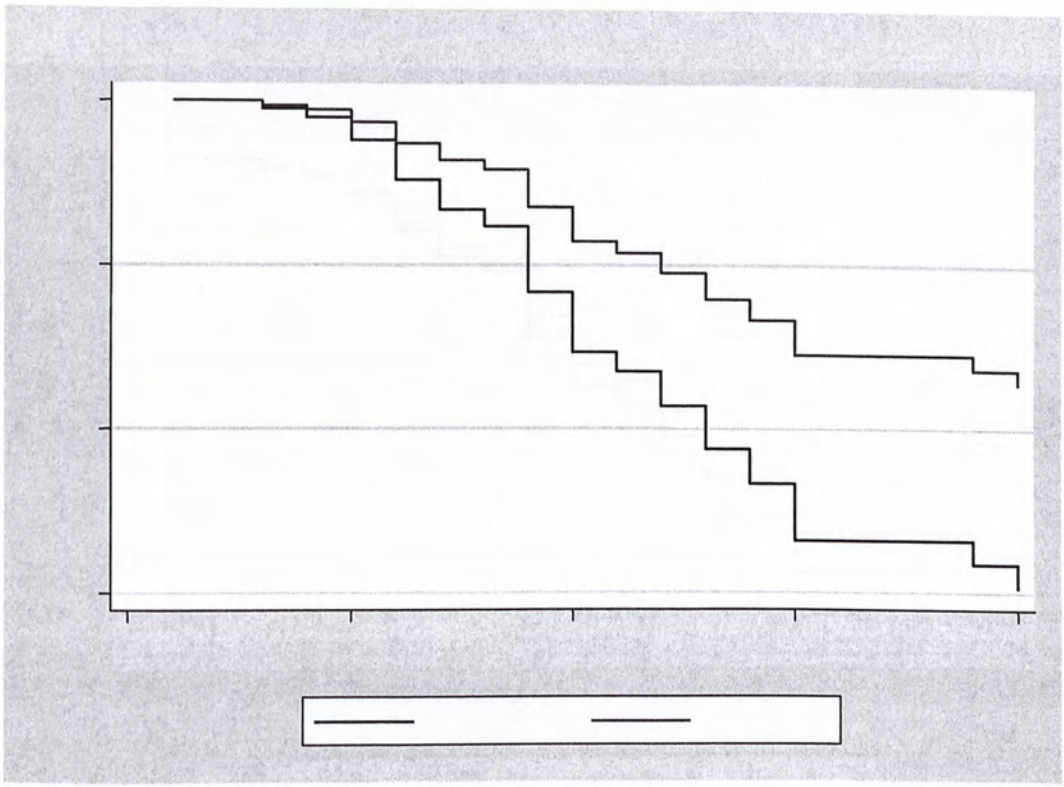
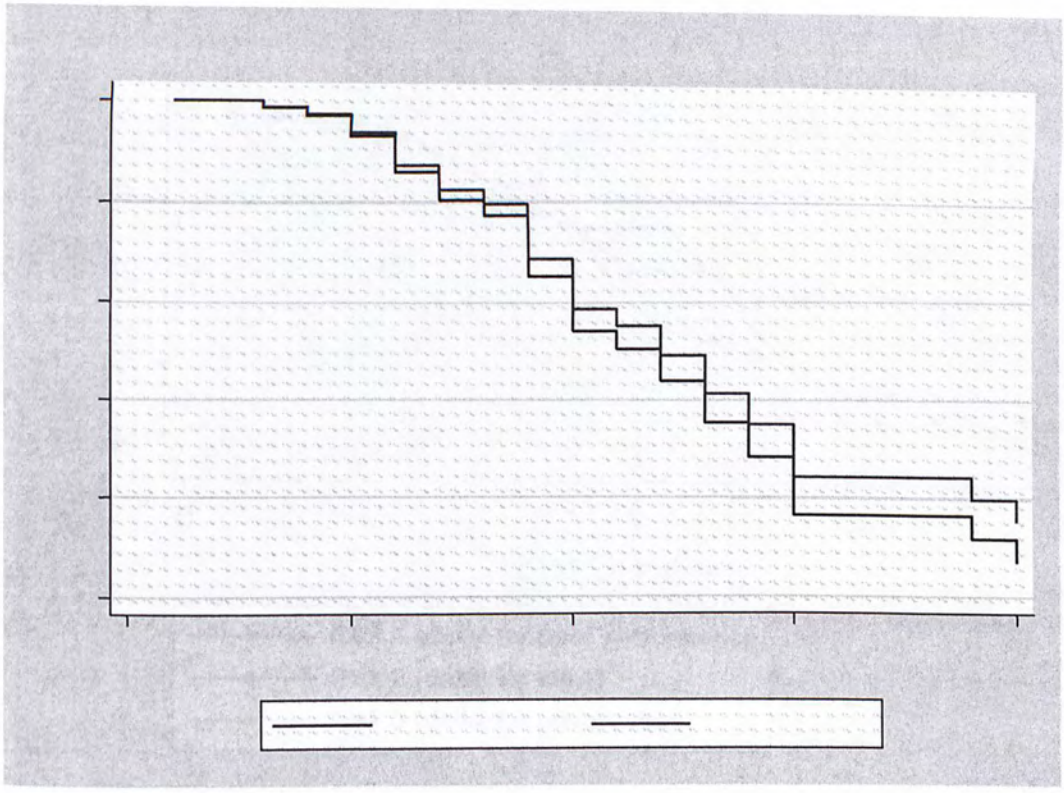


Figure 6 Survival Function Estimates by Profitability Status



Note: H-Profit denotes the companies whose profitability is higher than the median of the whole sample. L-Profit denotes the group with a lower profitability.

Figure 7 Survival Function Estimates by Growth Status



Note: H-Growth denotes the companies whose growth rate is higher than the median of the whole sample. L-Profit denotes the group with a lower growth rate.

Figure 8 Baseline Survival Function of Competing Risk Model

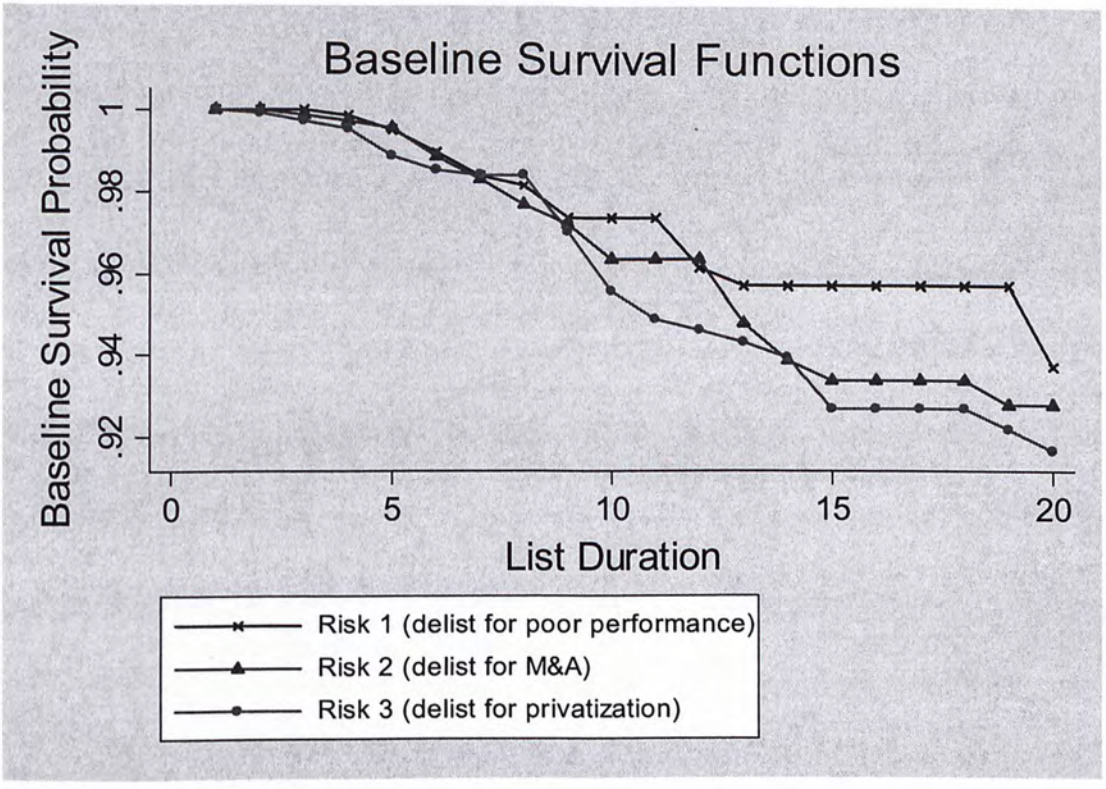


Figure 9 Baseline Hazard Function of Competing Risk Model

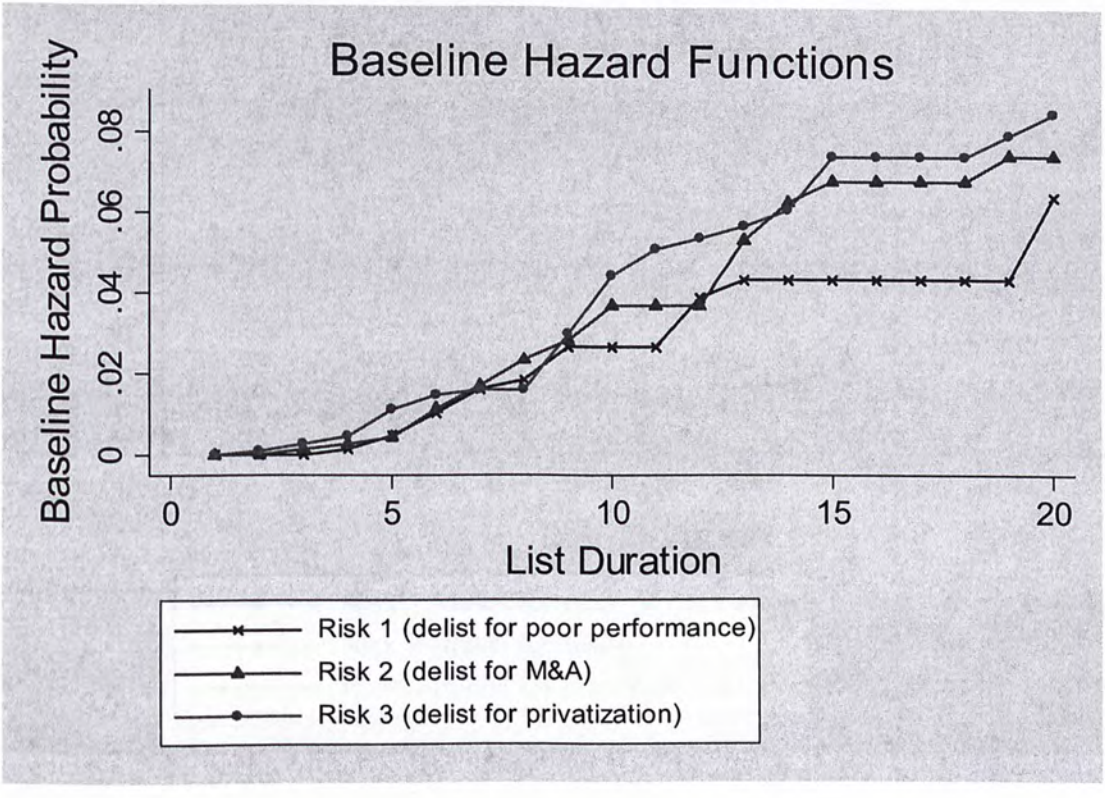


Figure 10 Conditional Hazard Function of Competing Risk Model